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27 March 1946

ANALYSIS OF MILITARY KNOWLEDGE TEST, TC-101x

I. BACKGROUND.

Communications deted 19 July 1944 and 9 October 1944 from the Assistant Chief of Staff, G-1, directed the Personnel Research Section, Classification and Replacement Branch, AGO, to construct, validate, and standardize a test for the measurement of Military Knowledge. A preliminary form of the test, designated as Military Knowledge Mest, TC-101x, was constructed in the field by members of the staff of the Personner Researc. Section with the cooperation of instructors and supervisors of Military Training. The test was reviewed by Assistant Chief of Staff, G-3, Headquarters Army Ground Forces; and Military Training Division, Headquarters Army Scrvice Forces.

II. PROBLEM.

- l. To determine the validity of Military Knowledge Test, TC-101x, item; in differentiating between enlisted men who meet the minimum qualifications required to be considered fully trained and those who do not possess those qualifications.
- 2. To determine the effectiveness of the Military Knowledge Test with particular reference to its usefulness among enlisted men with AGCT scores in Army grades IV and V.

III. POPULATION.

The preliminary form of Military Knowledge Test, TC-101x, was administered to six (6) groups of enlisted men as indicated in Table I.

TABLE Í

follows

TABLE I

POPULATIONS USED IN THE ANALYSIS OF
MILITARY KNOWLEDGE TEST, TC-101x.

Group		Weeks of	•	
Number	N	Training	Post	Arm or Service
I	450	17	Fort Bragg, N. C.	Field Artillery
II	581	15	Camp Wheeler	Infantry
III	728	6	Camp Wheeler	Infantry
IV	513	0	Fort Dix, R.G.	Unassigned
γ	500	*	Fort Bragg	Field Artillery
VI	120	% * *	Fort Dix, N.J.	

- * Enlisted men in this group had various amounts of training in units and beyond the 17-week basic training period standard at the time of testing.
- ** Enlisted men in this group were casuals, returned from overseas, for retraining in provisional training course at Fort Dix.

IV. VARIABLES.

1. Test Variables.

a. Military Knowledge Test, TC-101x, consists of 125 four-alternate multiple-choice items (including three (3) practice items) dealing with information concerning facts important under battle conditions such as map reading, military discipline, first aid, etc. Items 118 to 125 are concerned with knowledge of Army rifles. Since both the M1 (Garand) and the M1903 (Springfield) rifles are used, two (2) variations of this section, (one dealing with each type of rifle) are employed. Examiness are given the choice of answering either set of items. The test score was the number of correct responses made by the examinee.

- b. AGCT standard scores were obtained for all enlisted men.
- 2. Criterion Variables,
 - a. Amount of military training as given in Table I constituted

the primary criterion. The extent of exposure to such training was constant from group to group except for the 500 continental trainees and the 120 casuals at Fort Dix.

- b. Soldier Performance Scale, TC-102x, was executed for each of the 500 continental trainees at Fort Bragg by the platoon leader and platoon sergeants in each organization and for the 581 15-weeks trainees at Camp Wheeler by the platoon sergeants. Re-ratings on the same instrument were obtained after one (1) week. The Soldier Performance Scale, TC-102x, consists of an 8" by 30" sheet of paper on which there are five (5) numbered boxes, $3\frac{1}{2}$ " by $5\frac{1}{2}$ " in size. Above each box appears one of the following descriptions:
 - (1) He is a very valuable soldier and would do an outstanding job in combat. He is very interested in his platoon, and works hard to make it an unbeatable fighting team. He can also do a fine job on his own if it becomes necessary. He can be trusted with considerable responsibility, and responsibilities are delegated to him. He is the kind of fellow you would most like to have with you on a patrol mission.
 - (2) He is a good soldier and would do a better-than-average job in combat. He is interested in the platoon and works hard to keep it a good fighting outfit. He can get along on his own pretty well when he has to work alone. You would have little hesitancy in assigning him work involving responsibility. He would be a reliable man to take along on a patrol mission.
 - (3) He is an average, run-of-the-mill soldier, steady and reliable. He would take care of himself in combat about as well as most of the men in the outfit. His interest in the platoon is enough so that he can be counted on to do his part without pressure. He gets along fairly well when he has to work alone. You wouldn't hesitate to take him along on a patrol mission if better mon were not available.
 - (4) His value as a soldier is somewhat limited. He cannot be counted on to do much in combat. He hardly ever goes out of his way to contribute to the officiency of the platoon, and has little team spirit. Ho lacks the ability and drive to do a good piece of work on his own, and requires supervision. You would not take him with you on a patrol mission unless you needed men pretty badly.

(5) He is of little value as a soldier. He would be almost worthless in a combat situation, and would lower the fighting efficiency of the unit. He can work only under close supervision, and would mess up almost anything he tried to do on his own. In a critical situation, he would be like to endanger the lives of his buddies, as well as the two would rather risk a patrol mission whose them take him along with you.

The name of each soldier to be rated was typed on a 3th x 5th card especially printed for the purpose. On the reverse side of the card, space is provided for recording the results. Ratings were accomplished under the direction of a technician from the staff of the Personnel Research Section and in accordance with the procedure described in the Soldier Performance Scale Manual, TC-Mlx (WD AGO PRT Number 329). After the rater assigns the cards of the men being rated to their appropriate group, the cards within each group are arranged in order of nerit ranking and marked.

Y. PROCEDURE AND RESULTS.

- 1. Item Analysis.
- a. An alternative analysis of the items in Military Knowledge Test, TC-101x, was performed on four (4) groups!

Fort Bragg, Field Artillery, with 17 weeks' training, Camp Wheeler, Infantry, with 15 weeks' training, Camp Wheeler, Infantry, with 6 weeks' training, Fort Dix, Reception Center, untrained.

Results of this analysis are presented in Table II.

TABLE II.

follows

TYEM ANALYSIS OF MILITARY KNOWLEDGE TEST, TC-101x SHOWING THE PERCENT OF SOLDIERS SELECTING EACH ALTERNATIVE OF EACH OF THE 122 ITEMS

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b. Since the greatest number of inductees are assigned to the infantry and since infantry training is most basic, it was decided to use the difference between the recent of 15-week infantry trainees at Camp Wheeler and the percent of untrained inductees from Fort Dix who made correct responses to the several items as the basis of item selection. These differences are presented in Table III.

TABLE III

DIFFERENCE BETWEEN PERCENT OF TRAINED AND UNTRAINED MEN GIVING CORRECT RESPONSE TO ITEMS IN MILITARY KNOWLEDGE TEST, TC-101x AND DISPOSITION OF ITEMS

KEY: A - Items auplicated in TC-101a

B - Items revised -minor changes- Included in TC-101a

C - Items revised - major

D - Items discarded

Item	Difference	Disposition		Item	Difference	Disposition
4	29	В		29	48	С
5	41	D		30	69	A
6	61	B		31	11	C
7	27	${\mathtt B}$		32	5	B D
8	<u>44</u>	C		33	45	
9	37	C		34	55	Q
10	26 .	D B		35	57	A
11	, 13			36	20	<u>,</u> B
12	32 ``	A.		37	1.	,B B A D D
13	84 🗓	Œ		38	14	A
14	-43	B;		39	15	D
15	9	C		40	55	
16	4	\mathbf{A}^+		41	14	A
17	42	B D À D C		42	47	O
18	10	Ď,		43	4 6	A
19	23	A		44	4 6	В
20	17	.D		45	56	Q Ö
21	8	C	*	46	· 65	O
22	70	B '		47	12	E D O
23	22	٥	1	48	5	Ď
24	-32	\mathbf{D}_{c}		49	14	0
24	43	O		50	. 29	, D
26	6	A.		51	47	В
27	12	B .		52	55	A ;
28	27	D	•	53	37	0

TABLE III (continued)

KEY: A - Items duplicated in TM - 101a
B - Items revised -minor changes- Included in TC-101a

C - Items revised - major

D - Items discarded

<u>Item</u>	Difference	Disposition		Item	Difference	Disposition
54	19	D		90	30	B
55	15	D		91	•-3	D
56	41	Λ		9.2	19	В
57	<u>44</u>	A		93	13	A
58	81	Q		94	7	D
59	19	${\mathtt B}$		95	28	C
60	44	C		96	7	В
61	5 9	\mathbf{A}	•	97	-4	D
62	63.	0		98	20	
63	34	A		99	-4	C A A
64	8	B		100	 3	A
65	30	A		101	2	В
66	14	${\mathtt B}$		102	14	D
67	25	D		103	-2	C
68	35	D		104	10	D
69	41	В		105	0	C
70	-1	D		106	6	A
71	28	C		107	5	B
72	13	D		108	4 8	A
73	3	C		109	37	C
74	<u>A</u>	${\tt B}$		110	23	D
75	8	A		111	-8	A. C
76	15	D		112	19	
, 77	<u>44</u>	B		113	29	` A
78	28	A		114	16	$\boldsymbol{\sigma}$
79	9	C		115	26	B C
80	<u>4</u> 8	A		116	33	C
81	23	C		117	34	D
82	4	3		118	-4	B G A
63	-34	D		119	64	Ŏ
84	10	D		120 121	89 42	A.
85	0	O D		122	42 76	, D <u>A</u> -
86	73	D		123	76 71	G G
87	15	A.				
88	55	O C		124	65	B
89	47	0		125	44	D

- c. The number of trained enlisted men who selected the questions on the M1903 (Springfield) rifle was inadequate for item analysis purposes. Hence, items 118 through 125 were analyzed only with respect to the M1 (Garand) rifle.
- d. Item selection was made on the basis of inspection of the magnitude of the difference between percent of trained and untrained enlisted men responding correctly to each and by the importance of the subject matter of the items to the information needed by a soldier under combat conditions. Twenty-nine (29) items were discarded as invalid. Four items were included despite their low discrimination level because they were fundamental to military knowledge. Twenty-five (25) items were revised to increase their validity and 64 items were adequately valid to justify their inclusion without further revision. Sevon (7) new items were constructed to yield 100 test and three (3) practice items in the new form of Military Knowledge Test, designated TC-101a.
- 2. Relation of Military Knowledge Test to the Army General Classification Test.
- a. Considering the fact that 32% of the final form of Military Knowledge Test, TC-101a, were either revised or entirely new items, the requirements of adequate experimental design demand that the validity of TC-101a as well as its relation to the AGCT be determined on a new population exposed to the revised form of the test. Time limits imposed upon the Personnel Research Section, AGO, precluded the possibility of conducting the necessary research. To approximate the results that might be anticipated from such research, the TC-101x papers were re-scored for the 64 items which were to be used in TC-101a and the 25 items which were revised for inclusion in TC-101a.
- . b. The results reported below are based on the re-scoring of TC-101x.
- c. The AGCT relative frequency distributions, means and standard deviations of the several populations are presented in Table IV. It will be noted that the mean AGCT score of the Camp Wheeler (15 weeks) population is almost four (4) score points below that of the Fort Dix population. These constitute the cases used in the item analysis. Thus, any correlation between the Military Knowledge Test, TC-101x, and AGCT would tend to minimize the validity of the several items as a means of differentiating trained from untrained personnel.

TABLE IV

TABLE IV

DISTRIBUTIONS OF ARMY GENERAL CLASSIFICATION TEST SCORES
FOR FIVE (5) GROUPS OF ENLISTED MEN

	-	. 81 . 80.400			
	Fort Bragg (17 weeks)	II Camp Wheeler (15 weeks)	Camp Wheeler (6 weeks)	Fort Dix, RO (O-weeks)	Fort Bragg (17 weeks Cont. Tng.)
145-149		• 3%	, 2%	.4%	_
140-144	•2			2.2	.2%
135-139		1.3	•8	1.5	7.
130-134	•7	2,1	₆ -8	2,2	1.6
125-129	•4	4.7	2,3	2°2 3°2	1.2
120-124	2,0	8.0	4,2		3.6
115-119	2.7	9.0	4,6	8.1 8.8	5.8
110-114	4.4	10.1	6.7	11.0	3 . 6
105-109	.6•€6	9.8	8.6	11.4	10.0
100-104	6.9	7.0	9.2	2.9	8 .4
9599	12.6	9,0	9.7	8.5	6.0
90-94	9.5	7 . 5	10.3	10,7	10.4
8 5-89	8.2	7.8	8.8	7.7	6.4
8084	7.7	3,6	6.3		5,6
75-79	8.6	6,7	9,5	4.0	4.8
70⊶74	8.9	4.9	· 6.3 ·	5 _• 5	6.2
65-69	9.7	4 •4	- 6 <u>.</u> 9	3.3	5•2
6064	5,8	3.4	3 _• 6	1.5	5.2
55-59	2. 4		.2	1.5	4.0
5054	1.8	~3		5.2	3.0
45-49	•4	••	• 6		S. S.
40-44	•4	•3	2		• ₫
35⊶39		••	•\$		` 8
30-34			•		
Mean	86.6	99.4	93.1	70	1.1
$S_{ullet}D_{ullet}$	18,1	19,4	18.5	103.0	95.0
N	450	387	476	18.4 258	22 . 0 499

d. Product moment correlations between 89* of the TC-101x items and AGCT were .57 for the 385 Camp Wheeler 15-weeks' trainees used in the item analysis and .66 for the 192 Camp Wheeler trainees (15 weeks) not used in the item analysis. The correlations between the AGCT and the several criteria in these groups are presented in Table V.

TABLE V

CORRELATIONS BETWEEN SOLDIER PERFORMANCE SCALE
RANKINGS AND RATING AND AGCT SCORES.

Criterion	Camp Wheeler - Used in Item Analysis N=385	· 15-Week Trainees Not Used in Item Analysis N=192
Platoon Sgt		
lst Rating Flatoon Sgt	. 24	.23
2d Rating	• 24	•15
Platoon Sgt		
1st Ranking	• 23	. 26
Platoon Sgt 2d Ranking	.22	,20

e. Table VI presents the correlations between the 89 selected items and the measure of soldier performance.

TABLE VI

follows

^{*} Four (4) additional items in TC-lOlx which were included in TC-lOla were emitted from this scoring. While these four (4) items have low validity, they constitute too small a portion of the total test variance to effect the correlation seriously.

TABLÉ VÍ

CORRELATIONS BETWEEN SOLDIER PERFORMANCE SCALE RANKINGS AND RATINGS AND SCORES ON 89 OF THE ITEMS COMMON TO TC-101x AND TC-101a.

	Camp Wheeler 15-W	reek Trainees Not Used in
	Item Analysis	Item Analysis
Criterion	N=385	N=192
Platoon Sgt		
1st Rating	•36	•34
Platoon Sgt 2d Rating	. 35	. 30
Su maring	•00	• 50
Platoon Sgt		
lst Ranking	. 37	• 35
Platoon Sgt 2d Ranking	. 35	•34

- f. The correlation between the first and second ratings of the platoon sergeant is all for the Mem analysis group and .83 for the remainder of the Camp Wheeler 15-weeks' trainees. The correlations between first and second rankings for the same group are .80 and .83, respectively. The correlation between the first ratings of the platoon leader and the platoon sergeant is .55 for 465 Fort Bragg continental trainees. A correlation of .76 between the first rankings of the platoon leader and that of the platoon sergeant was obtained on the same population.
- g. Graph I presents a comparison of the relative frequency distribution of the scores of 194 Camp Wheeler 15-weeks trainees not used in the item analysis and of the 241 Fort Dix untrained soldiers on the 89 items common to TC-101x and TC-101a. (Graph attached)

VI. CONCLUSIONS.

- 1. Evidence indicates that TC-10la will successfully differentiate between trained and untrained enlisted men.
- 2. Since extensive revision of certain items and the construction of new items was required, further research is necessary to establish cutting scores.
- 3. The Soldier Performance Scale shows satisfactory reliability as indicated by both the correlation between raters and the correlation between the first and second ratings.
- 4. The validity of TC-101a as indicated by its correlation with Soldier Performance ratings is not generally satisfactory within a group as homogeneous with respect to trainings as those upon which results are available. Where the variance of the group tested is greater than that

obtained here, more satisfactory predictability may be expected.

VII. TECHNICIANS.

1. Technicians with major responsibility for study:

Lt James M. Lynch Lt Albert H. Berg

2. Technicians responsible for collection of data:

Lt James M. Lynch Lt Albert H. Berg Lt Louis P. Willemin, Jr.

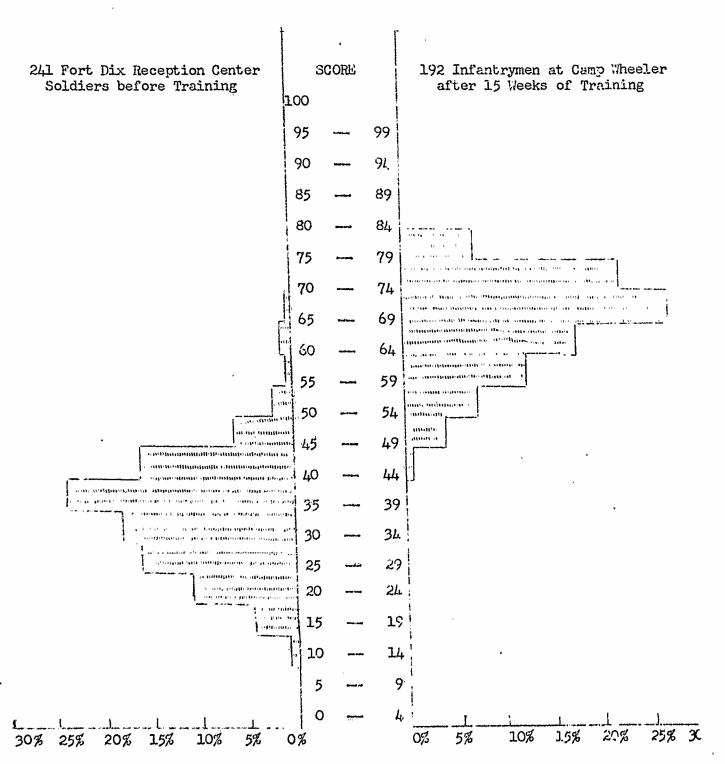
Technician responsible for analysis of data:

Miss Edith Cummins

4. Report written by:

Dr. E. K. Taylor

COMPARISON OF THE DISTRIBUTIONS OF SCORES ON MILITARY KNOWLEDGE TEST, TC-101a*, OF UNTRAINED MAN AND 15-WEEKS TRAINEES



*Based on 29 out of 100 items contained in final form TC-101a.

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